Applying Information System in Healthcare Organization: A Case Study in Small and Medium Sizes of Clinics.

By

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Dissertation submitted in partial fulfillment of
the requirements for the
Bachelor of Technology (Hons)
(Information and Communication Technology)

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CERTIFICATION OF APPROVAL

APPLYING INFORMATION SYSTEM IN HEALTHCARE ORGANIZATION: A CASE STUDY IN SMALL AND MEDIUM SIZES OF CLINICS.

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Information Technology Programme
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in partial fulfillment of the requirement for the
BACHELOR OF TECHNOLOGY (Hons)
(INFORMATION AND COMMUNICATION TECHNOLOGY)

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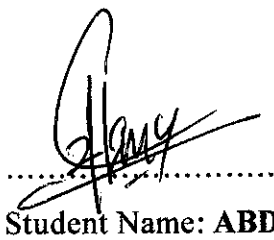
CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own expect as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.



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ABSTRACT

'Applying Information System in Healthcare Organization: A Case Study in Small and Medium Sizes of Clinics'

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Nowadays, people are rushing in chasing time in order to fulfill their daily work. This will make sure that every task that they do needs to be done quickly and correctly. We do realize that ICT can really assist people in real life and we simply know that Information System (IS) under ICT can be applicable in every single area of organization such as management, education, business, engineering, accountancy, researching and etc... Usually IS synonym to computer based information system which can implement for recording, storing and deleting the data from the users easily. Because of this point, focus of this research is to study on how information system can assist the organization like healthcare centre on specific to small and medium sizes of clinics carrying and managing their own data from manually to automatically with having a high usability, reliability, and security of the data itself. The study will differentiate the definition between small and medium sizes of clinics itself and also trying to study further on how important and relevant to applied IS in this organization. The outcome of this study is to define and differentiate between small and medium size clinic function and services and as well as to build and develop a prototype based on the information on the feedback from the users.

Keywords: *Clinic functions and services, computer Information System (IS), healthcare organization, Health Information System, small and medium sizes clinics*

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LIST OF ABBREVIATION

UTP	Universiti Teknologi PETRONAS
ICT	Information and Communication Technology
IT	Information Technology
IS	Information System
ID	Identification
IC No.	Identification Number
NITA	National Information Technology Agenda
SME	Small and Medium Sizes Enterprise
MRS	Manufacturing Related Services
M.D	Medical Doctor
HIS	Health Information System
PHP	Hypertext Pre Processing
RAM	Random Access Memory
MB	Megabyte
KL	Kuala Lumpur
STD	Standard

CHAPTER 1
INTRODUCTION

1.0 BACKGROUND

Nowadays, there are lots of small and medium sizes of clinics with few staffs and doctors provide outpatient services to patients with various symptom of sickness in Malaysia. Everyday in one clinic, they will serve many patients based on their sickness. The clinics are responsible to process the patient's information, diagnosis of patients as well as maintain the inventory's information that needs to be update monthly.

The research that had been done shows that most of the clinics are still using manual system to manage their daily business process. By using a paper based process will definitely caused many related problems to the management such as data missing, involved lots of paper took a longer time to mange and many more. The purpose of this research is to develop a computerized system for clinics to substitute with the current manual process.

A clinic in Malaysia can served their patients more smoothly and securely if there is a proper system can conduct its daily business process. The existing one can be used to improve and automate all the forms from manual to electronic. Hence, a system called 'Health Information System' is reliable to develop as it can save time, cost and the most important thing is can definitely save space in the clinics itself.

This prototype will soon be able to ensure standardized, reduce human error and simplified business process in the organization.

1.1 Description of the Problem

There are some problems occur while using manual business process in daily task such as:

1. Manual system took a longer time to use and mange, lots of paper involved, data was not secure, data can easily be stolen, troublesome and many more.
2. Data missing or data lost is also recognize as a main factor that contributes to the main problems for manual system. This problem always occurs in clinics and hospitals because as we know manual system does not good and applicable enough.
3. The culture of Malaysian people prefers doing their task manually rather than using an electronic based may caused clinicians refused to develop its own system.
4. Lastly, high cost factor may also contribute the reason why clinicians refused to develop its own system.

1.2 Significant / Relevancy of the Project

This project focuses on the defining a definition of IS in small and medium sizes of clinics and collect all the important functionalities information that should have in clinics information system. By doing so, it can assist to develop a good prototype that can ease and fasten the existing process in the clinics.

1.3 Objective

To study on computerized system utilization, business processes and develops a prototype for small medium sizes clinics.

1.4 Scope of Study

The scope of this project is:

- To conduct a research on the computerized system utilization by small and medium size clinics.
- To conduct a research on standard business processes in different business functions commonly shared by the small and medium size clinics.
- To develop a prototype to automate standard business processes for small and medium size clinics.

1.5 Feasibility of the Project

The author is responsible to develop a prototype for a clinic to manage their daily business process based on the findings from research that had been done. The prototype is the electronic method from the current manual process. The users can easily mange the data into a systematic system. The development process should be completed within three months.

CHAPTER 2
LITERATURE REVIEW

2.0 DATA SOURCES FOR LITERATURE REVIEW

The searching is including in Blackwell Publishing (2005-2007), Medline (1970-2003), Healthoneclinics (2001) and many more for relevant studies of journal using combinations of the following search terms:

- Small and medium sizes of organization
- Clinics functions and services
- Computer Information System
- Health Information System
- Computer assisted
- Healthcare Organizations
- Etc...

A systematically searching on reference lists of includes studies and relevant reviews also had been done.

2.1 Clinic Information System Status in Malaysia

Most of clinics and hospitals within Malaysia use computerized systems only to manage personal information of the patients. This is totally differs with European countries where computer applications and systems are used to study and analyze patient's data. In additional, many clinics and hospitals use small scale software only to manage financial and insurance information of patients which of course can only be assessed by accounts department. However,

European countries use internet, intranet as well as web based system to facilitate doctors to access patient data efficiently (Nabeel Tahir, 2007).

2.2 Malaysian Perspective On ICT Development To Served Citizens

Main agenda of Ministry of Health is to modernize all their services and improving their communication services to the clients. Because of this, clinicians should make themselves fully equipped and knowledgeable with the latest technology in providing a good quality services In order to gain client's trust (Ministry of Health, 2007).

Malaysian government has established a clear vision to embrace ICT and has been a driving force in the modernization of the public services in recent years. For example, the National IT Agenda (NITA) provides the foundation and framework for the utilization of ICT to transform Malaysia into a develop nation in it own mould consistent with its Vision 2020 (National IT Agenda-NITA, 2004).

2.3 Small and Medium Sizes of Organization

Applying Information System in small and medium sizes clinics is now recognized as single most important assets of any healthcare organization. According to Secretariat to National SME Development Council, Bank Negara Malaysia (2005) the definition of small and medium sizes of enterprise will be based on two criteria, namely:

I. Number of employees; or
II. Annual sales turnover

Also, the definition will apply for the following sectors:

I. Primary agriculture;

II. Manufacturing (including agro-based);

III. Manufacturing Related Services (MRS); and

IV. Services (including ICT)

Because clinics fall in category four which is Services, the secretariat definition based on small type of organization is an enterprise with full time employees between 5 and 19 or with annual sales turnover between RM 200,000 and less than RM 1 million. While medium type of organization is an enterprise with full time of employees of between 20 and 50 or with annual sales turnover between RM 1 million to RM 5 million. European Commission (2003) stated that small organization is a company with fewer than 50 employees while medium organization is a company with fewer than 250 employees.

2.4 What are Clinics Functions and Services?

According to Beatrice M. Rosen and Jack Wiener M.A (2002) from American National Institute of Health, clinics functions and services is to providing a direct services to patients, with its primary functions is to give a consultation, giving a training healthcare and doing a research.

While Forest E. Rieke, M.D (1980) describe clinics functions is that clinics will supervised nurses, immunization and emergency services.

"Clinics public services is a free consultation services and it is a sort of first aid for all the people whatever the social status" (Craig Rad 2007).

2.5 What is Computer Information System?

Computer Information System has become one of the most important tools to all types of industry today (Ciborra 2002). Major types of Computer Information System include structural database and information management software that can include:

- Transaction Process System.
- Enterprise Collaboration System
- Management Information System
- Decision Support System
- Executive Support System

According to Aceituno, Vicente (2004)

The term Information System has different meanings. Information System can be described by five objects, which is:

- Structure – repositories, interfaces
- Channels – networking
- Behavior – Services and messages which carries meanings to user or services

In system theory, IS is a system automated or manual that comprises people, machines and method organized to collect a process and then transmit it and disseminate the data that represent user information (Angell I.O and Smithson S. 1991).

2.6 Health Information System

Health Information System (HIS) has become one of the most important information systems that contains a computer equipment, programs, procedures, and personnel designed, constructed, operated and maintained to collect, record, process, retrieve, and display information with specific to a health care domain.

There are a lots of health information system that being develop in the world's market. Driven by advancing technologies and their clinical applications, the emerging field of healthcare information system and informatics is required for directing to advance healthcare and clinical practices and research, transfer and reuse of Healthcare Information System and Informatics (Joseph Tan, 2006).

Richard F. Daines, M.D (2007), the goals of healthcare system are oriented around the patient, with strong privacy protections, reporting on quality of care and outcomes. It is clear that the statement strongly support the development of clinical information system because there are many benefits health practitioner can gain on it.

According to Bambas L. (2005), a human rights approach to health information system also supports effective health development. To effectively improve population health, governments and communities need access to socioeconomically population health data. Every human beings have right to have a good healthcare services.

2.7 Computer Assisted

In the current era of ICT are expected to bring major impact in changing the way we used to perform our work and deliver services to the dedicated beneficiaries. Computer nowadays are becoming best friends and a major assistant for people to do their daily task.

By using a computer, every task can easily be done. People and machine will operate together because it draws from supporting knowledge on both of the machine and people side (Hewerd, Becker 1996).

CHAPTER 3
METHODOLOGY

3.0 INFORMATION GATHERING METHOD

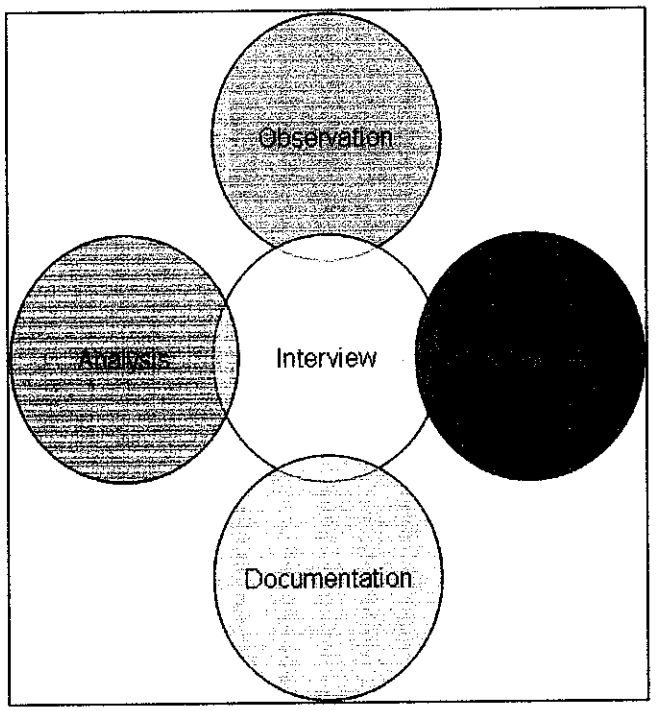


Figure 1: Information Gathering Method.

The assessment will be based on review of various documents, general observation, conducting interviews with key personnel as well as analysis.

Surveys will be conducted using various sets of questionnaires distributed to end users as well as the clinic staffs.

The information gathered was then analyzed using a methodology. I will also include the cost factor that always being the deciding factor in supporting those elements.

3.1 System Development Methodology

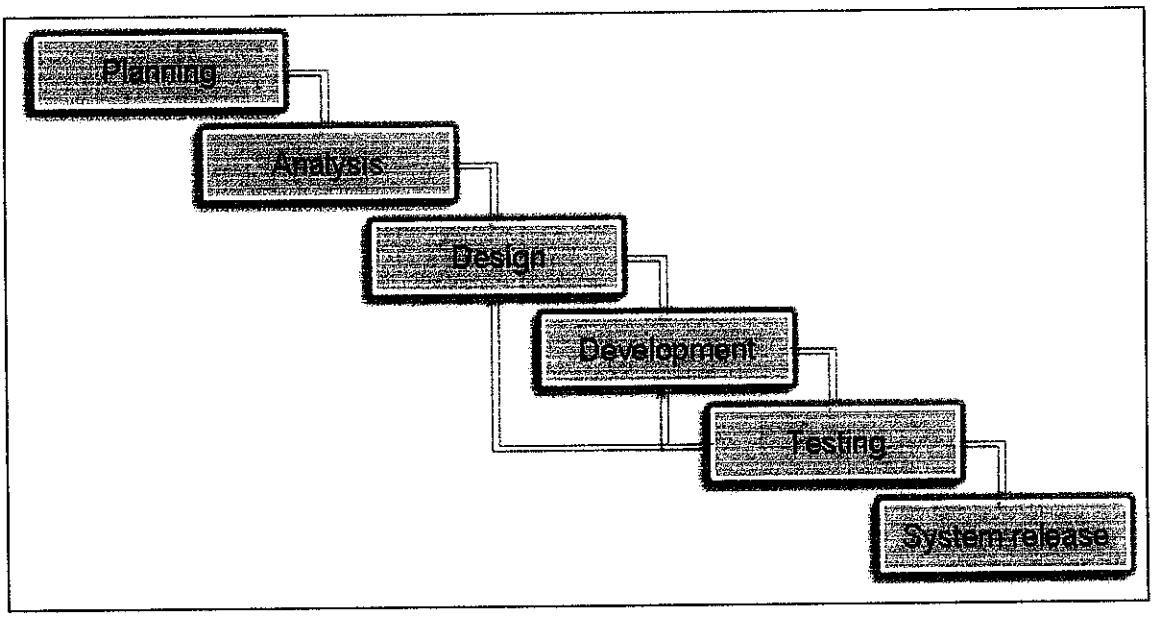


Figure 2: Waterfall Model Method.

The method that had been chosen to be used in development process of the system is Waterfall Model which is considering of:

1. Planning
2. Analysis
3. Design
4. Development
5. Testing
6. System Release

Each of the phases has its own role and usage on how the author can relate it with the development of the system.

3.2 System Requirement

3.2.1 Tools for Development

- Hypertext Pre Processing (PHP)
  - ✓ Open Source.
- Adobe Photoshop CS2
  - ✓ Graphic editor for image and graphic processing.
  - ✓ To make header interesting and interactive.
- Macromedia Dreamweaver 8.0.

3.2.2 Server

- Apache Server

3.2.3 Database

- MySQL

3.2.4 Client (minimum requirement)

- Microsoft Windows XP Professional or Home Edition
- 500MB RAM
- 80MB of available Hardisk space
- Web browser that support:
  - ✓ Internet Explorer
  - ✓ Opera Browser

CHAPTER 4
RESULT AND DISCUSSION

4.0 INTRODUCTION

This chapter discusses the findings and research that has been done. Most of the findings were gathered through interviews, general observation, some analysis, distributing questionnaire, using internet, reference books, which have given great inputs and outputs to further this project.

4.1 Data Gathering

Based on the responses that the author has gathered through questionnaires and interviews as well as general observation to the chosen clinics around Kuala Lumpur (KL), an analysis had been done in order to know what the overview results from both of the discussion are. The questionnaires had been distributed to the staff in the clinics that is fully using the current manual system in their daily task. The respondent consists of 10 clinics around KL. The sample of Questionnaires is represented in attached. While in Interview section, the author officially manage to interview 5 staff on duty on that day as well as unofficially interviewed 6 staff using a phone call to help with the things that needs to knows about the patients registration process, diagnosis process and lastly inventory process in the clinics.

4.1.1 Result – Questionnaires

From the pie chart below, 100% of the respondent is using manual system to manage daily clinic's information system. Most of the reason stated by the responded stated that they only being exposed to manual system rather than

automatic system. The manual system that had been used since the old time is by using Microsoft Excel and file systems.

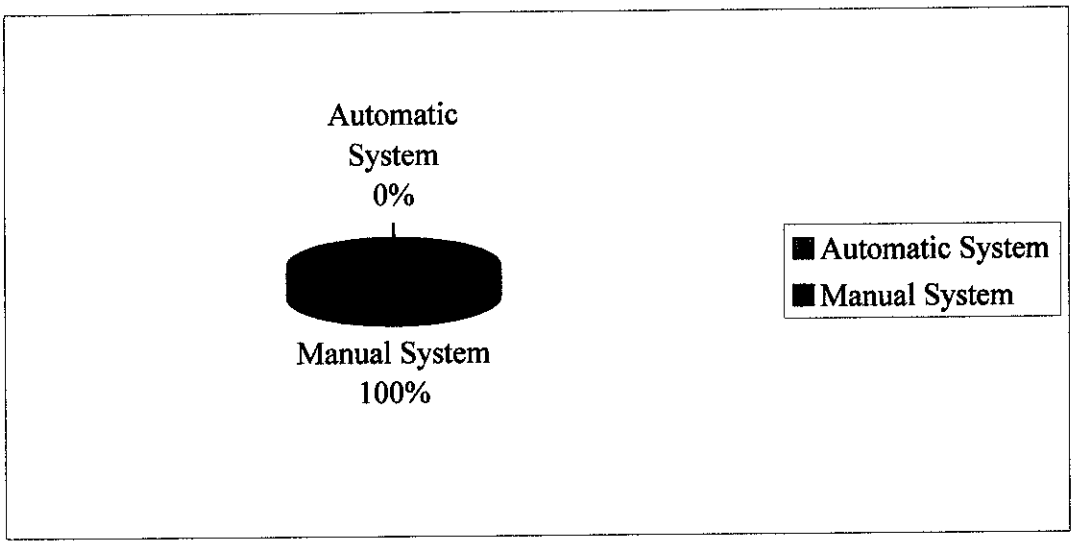


Figure 3 Pie: Clinicians feedback on the current system they are using.

For the next questions, the respondents were asked about their preferences system to manage daily clinic's information. From the pie chart below, 40% of the respondent preferred to manage daily clinic's information through online application compared to the current manual process. Most of the reason stated by the responded stated that having a system will increase their productivity and at the same time reduce the using of papers in daily process. While the other 60% respondents preferred to manage daily clinic's information manually stated the reason that they preferred to using a system that had been used since the old time. A high cost factor to develop and maintain a system also contributes to why clinics refuse to have a systematic system.

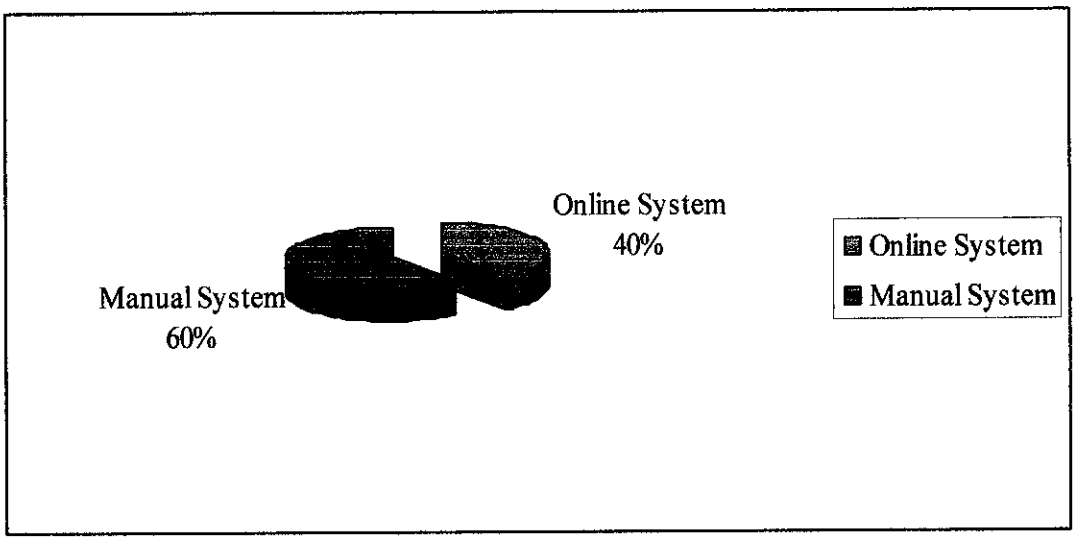


Figure 4: Clinicians feedback on their preferences to manage clinics information system.

For the next question, the respondents were asked to rank their satisfaction for the current manual process. 10% answered dissatisfied. 70% neutral and the other 20% answered satisfied. From the analysis, mostly the respondent answered neutral because the manual process had being use since the clinics was opened. This is due undecided opinion since they never try an online system for their daily task. So the new staff in one particular clinics just being exposed to the manual system form their senior to manage daily clinic's information.

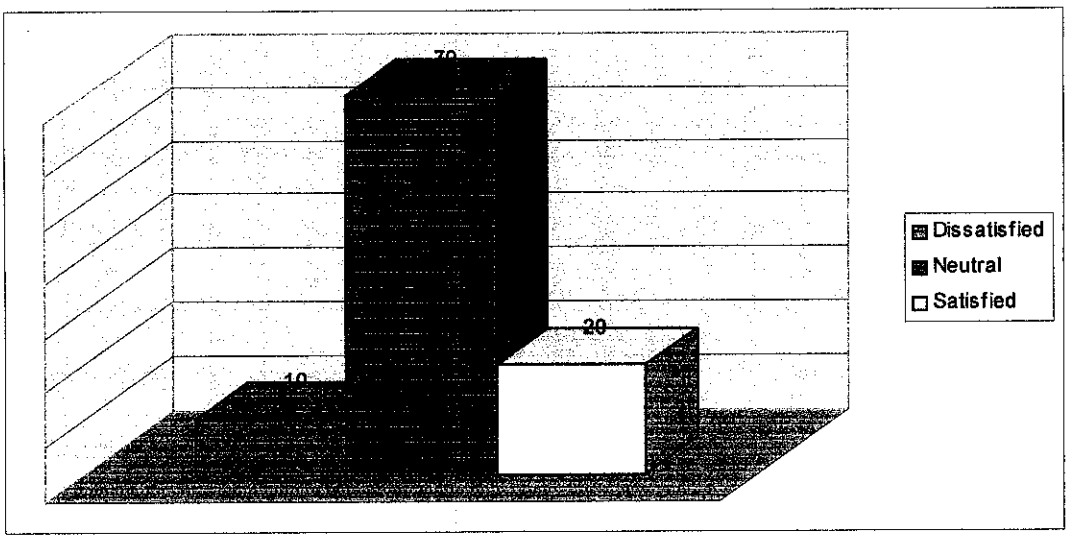


Figure 5: Clinicians ranking of satisfaction on the current manual process.

Majority of the respondents feel neutral if the system being manual or automatic process because for them the current manual process is easy to manage. But lastly, the decision is from the management of the clinics itself which refuse to develop a system for their clinics.

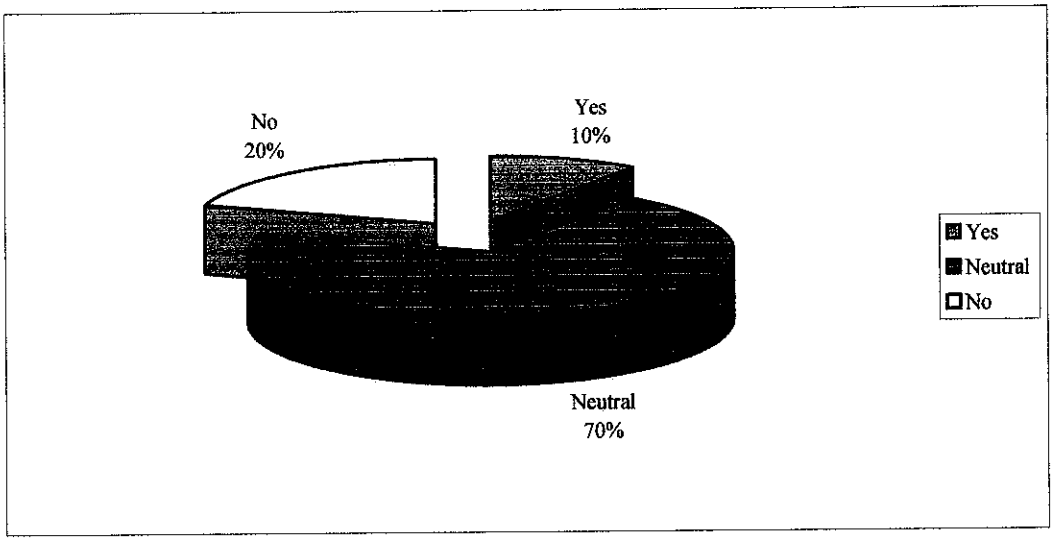


Figure 6: Clinicians feedbacks on the automation of the current process.

For the last question, the respondents were asked about the difficulty to manage the current system. They just need to tick either the current manual system is hard or not to manage (daily). Analysis showed that 70% tick Yes and other 30% tick No. Most of them are concern about spaces that need to store the old and current files that increase from time to time.

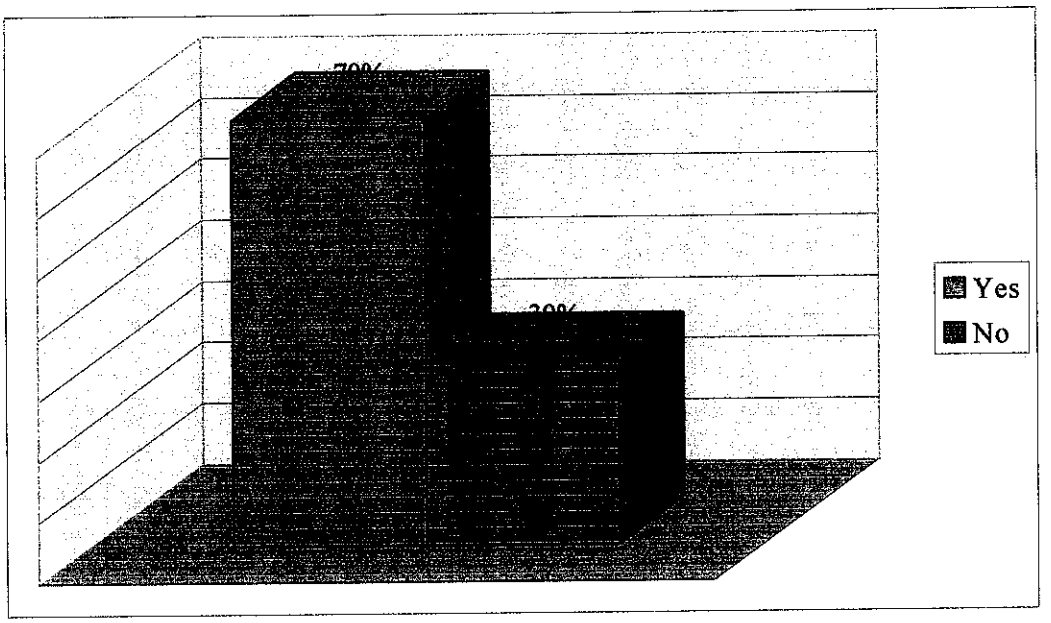


Figure 7: Clinicians feedback on their preferences regarding on the difficulty of current system.

4.1.2 Discussion – Interviews.

The author gained lots of information from the interview session with the clinicians at the several clinics in Kuala Lumpur. Some of them are really gives full cooperation in helping the author to get the necessary information needed but some of them are too busy because of having lots of patients. Most of them are neutral if there is an automated system to substitute the current manual process. For them, having a system can really help the clinicians to save more spaces in the clinics despite having a big locker to stored patients and inventories files. Through a system, the use of paper can be reducing.

In the previous updating and issued the invoice to the company that have a collaboration with the clinics need to be done manually, but by using the system, clinicians can automatically print out the invoice for the company immediately.

Overall, the respondent can try to have a systematically system to help them manage daily information in the clinics. From the author point of view,

having a system can ease their works and save time. In the future, there maybe other features applications can be stored into the system in order to enhance its performance.

4.2 System Development for Low Level Design

'Clinics Information System' consists of more than 20 pages including the external files. The system is divided into two parts which is (1) Staff Page and (2) Doctor via Administrator Page. In the Staff page, it will consists of Main page, Check Patient's Information page, Search Patients, Check Inventory's Information page and view all the inventory data history. While in Doctor via Administrator Page, it consists of Patient's Information page, Diagnosis Information, Diagnosis's Information page as well as Inventory's Information page. The doctor can view all the data in all three main links.

4.2.1 Storyboard

Storyboard is divided into two parts (1) Staff and (2) Administrator. Both of the design is based on: (Storyboard is represented in APPENDIX D.)

- Usability
  - ✓ The key functional in the system should be easily accessible and obvious.
  - ✓ If the user had problem to understand the system, there is a help menu to help to assist them through out the system.

- User friendliness
  - ✓ This system is design to make the user's job easy, quickly and efficiently.
  - ✓ The button, linking and menu are understandable and easy to navigate.

- Intuitiveness
  - ✓ The author has eliminated certain manual steps and combine task into one simplified process.
- Workflow
  - ✓ Implement logical workflow process that is easy to go from one step to the next.
  - ✓ Figure 4.6 illustrate the flow for the process.

- Consistency
  - ✓ Keep forms, menus and other interface elements consistent throughout the entire system.
  - ✓ The design of the template for every page is the same. It will not confuse the user as the background is standardized to all pages.

4.3 System Modeling for High Level Design

4.3.1 Use Case Diagram

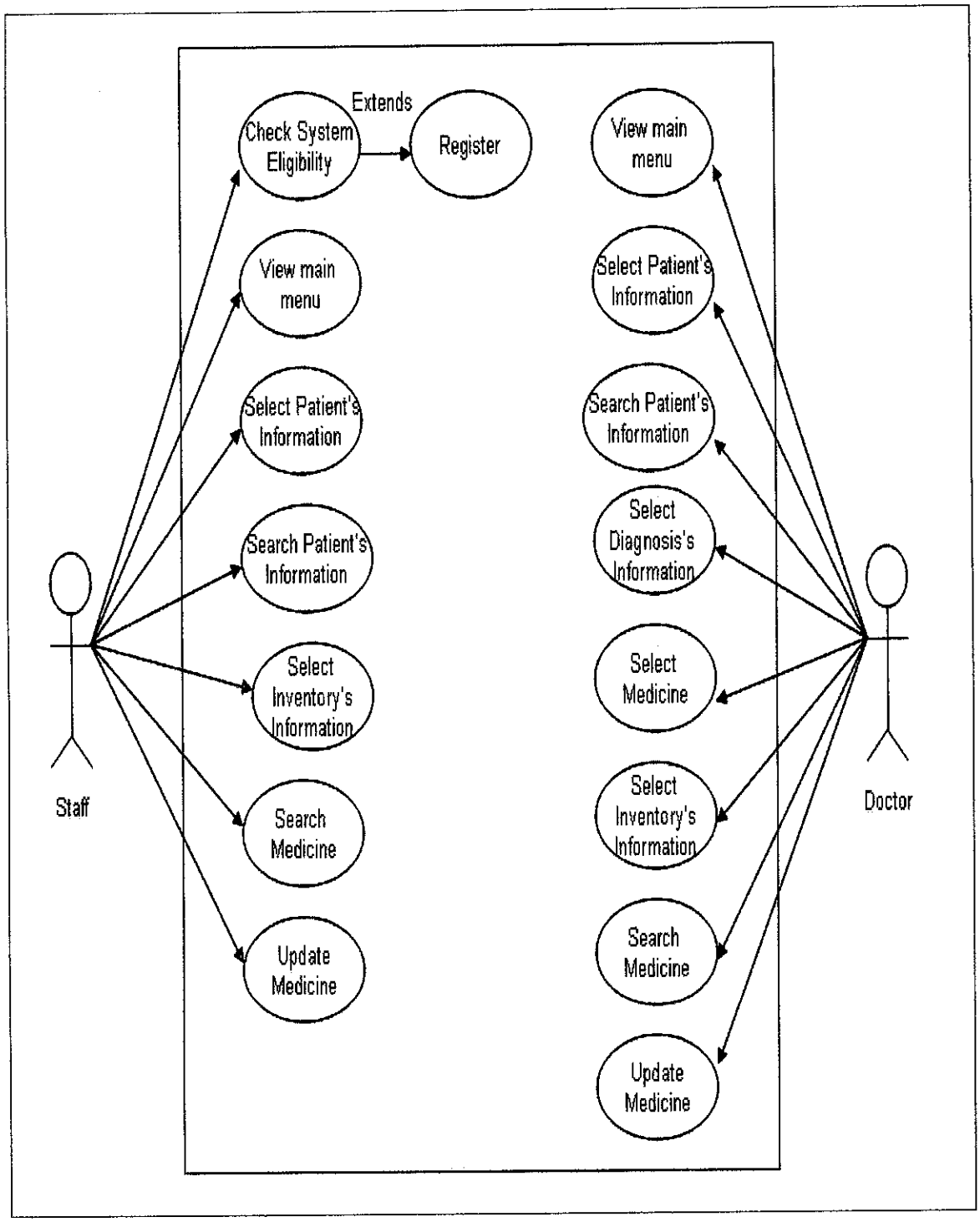


Figure 8: Use Case Diagram for Health Information System.

4.3.1.1 Use Case Analysis

Use Case defines basic business process the system needs to handle. The actors represent the functions of a system, which the system must support from the user's point of view. Figure 8 illustrates the Use Case Diagram for 'Health Information System'. The actors that involve in the process are clinic's staff as well as doctor in duty. While there are 15 Use Case and 1 Extends Use Case involve in the system.

Staff:

1. Check System Eligibility
   - ✓ Staff will check whether they are eligible to run the system by inserting their Staff Username and Password

2. Login to Main Menu page
   - ✓ Only eligible staff with the correct ID can enter the main menu.
   - ✓ Staff can view the main menu in the system once they log in to the system.

3. Select Patient's Information
   - ✓ Staff can select either to select for register new patient by clicking New Record button or proceed with the old record by select Search Record button.

4. Select Inventory's Information
   - ✓ By clicking this button, staff can add and view the full history for current inventory information such as medicine.

Doctor:

1. Login to Main Menu page
   - ✓ Only eligible staff with the correct ID can enter the main menu.
   - ✓ Staff can view the main menu in the system once they log in to the system.

2. Select Patient's Information
   - ✓ Staff can select either to select for register new patient by clicking New Record button or proceed with the old record by select Search Record button.

3. Select Diagnosis's Information
   - ✓ Staff can view the old record for patient's diagnosis information by clicking this button. By entering the patient's IC number, staff can see full history of patient's diagnosis information.

4. Select Inventory's Information
   - ✓ Staff can view the old record for patient's diagnosis information by clicking this button. By entering the patient's IC number, staff can see full history of patient's diagnosis information.

Extends Use Case

8. Register
   - ✓ If new staff wants to use this system, they have to register their username as well as password.
   - ✓ Staff has to log in to the system using their Username and password.

4.3.2 Class Diagram.

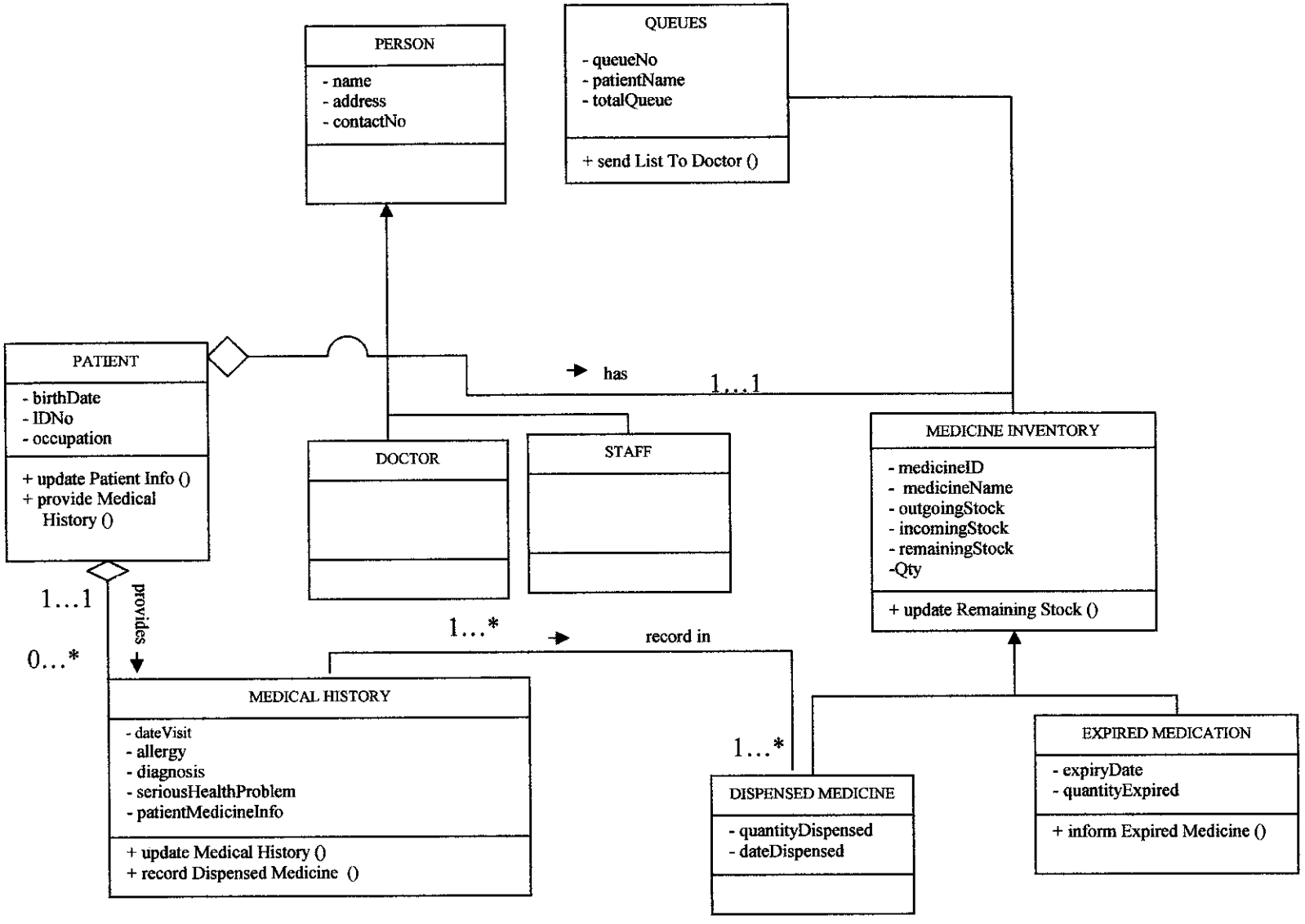


Figure 9: Class Diagram for Health Information System – Patient's Registration.

4.3.3 Sequence Diagram.

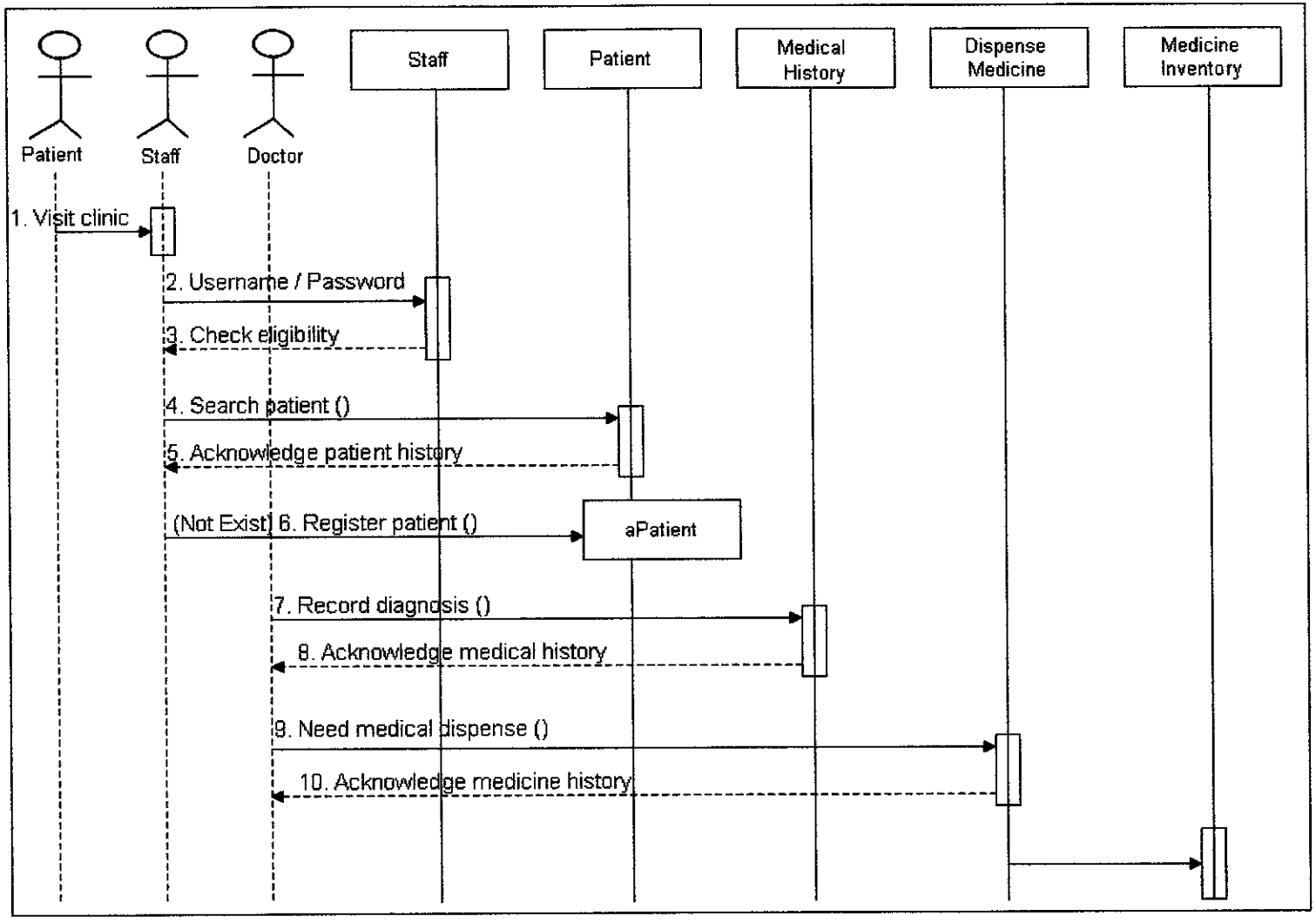


Figure 10: Sequence Diagram of the process in Health Information System.

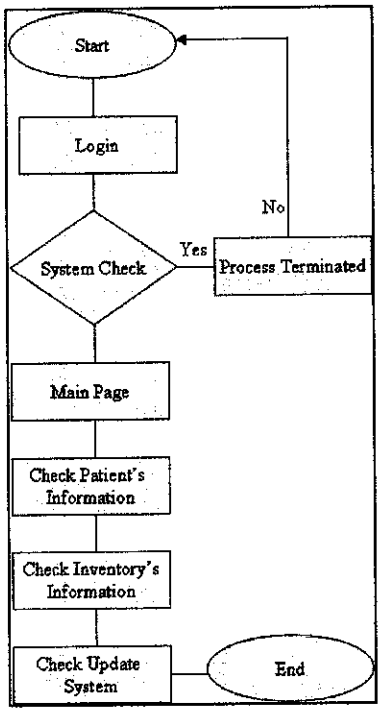


Figure 11: The flowchart for Staff.

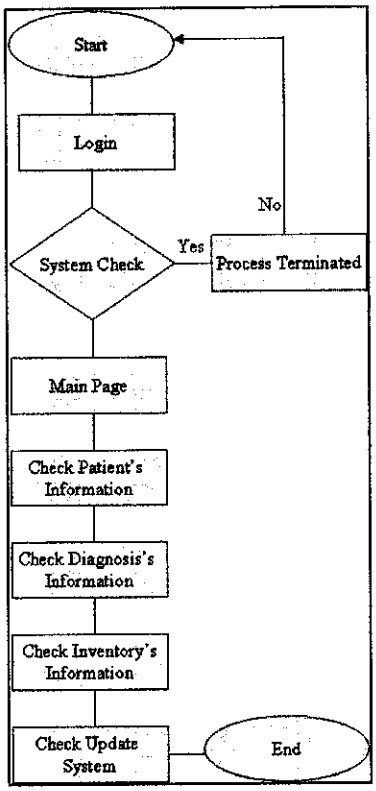


Figure 12: The flowchart for Doctor.

4.4 Functionality of the Prototype

Welcome / Login Page.

First, the welcome will include the Login page to the system.

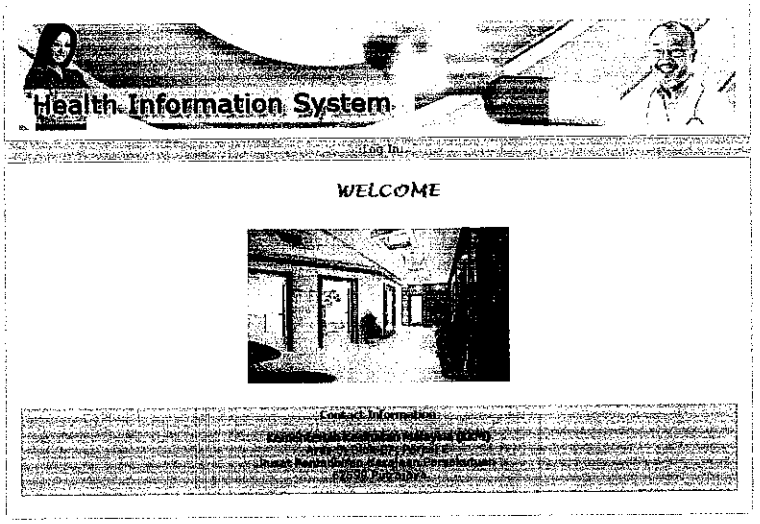
	**Description:** In the welcome page there will be a link to Login page. This welcome page is more to welcome the user to using a Health Information System.

Table 4.4.1: Welcome Page.

Login Page.

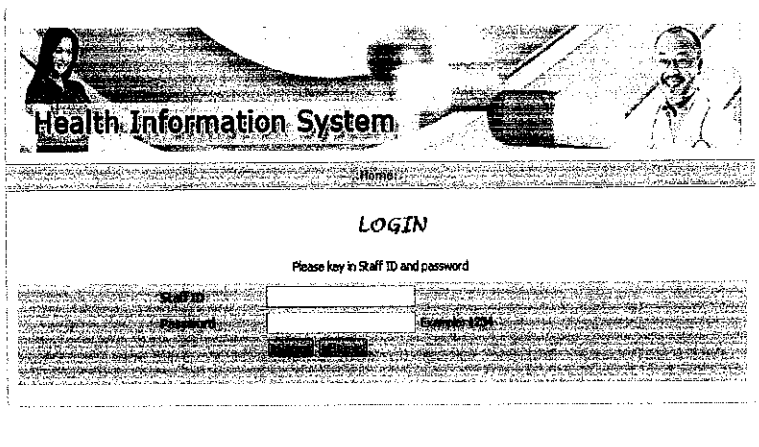
	**Description:** Only for those staff that is eligible will use their own ID and password to log in to the system. The password will be given to the eligible staff only.

Table 4.4.2: Staff Login Page.

Main Page

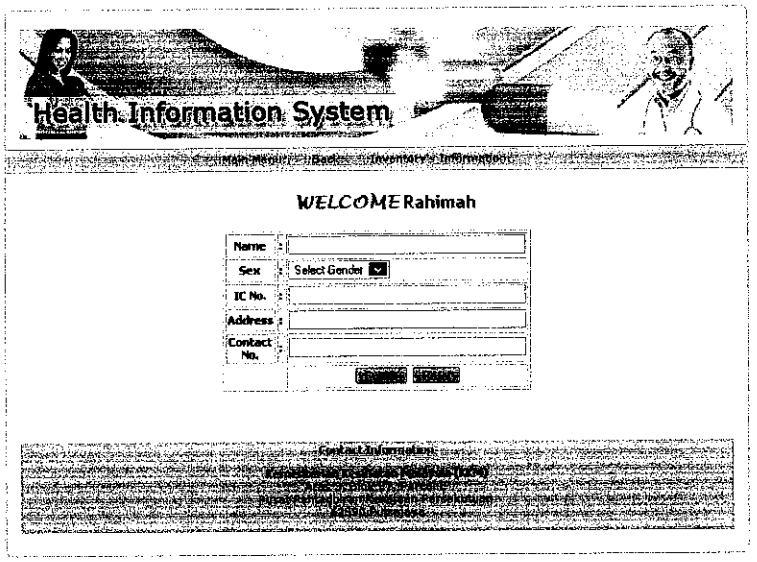
	**Description:** After successfully log in to the system, the student can view the main menu in the main page. There will consist of four different linkages. They are Patient's Information, Inventory's Information as well as Log out.

Table 4.4.3: Staff Main Page.

Patient's Information.

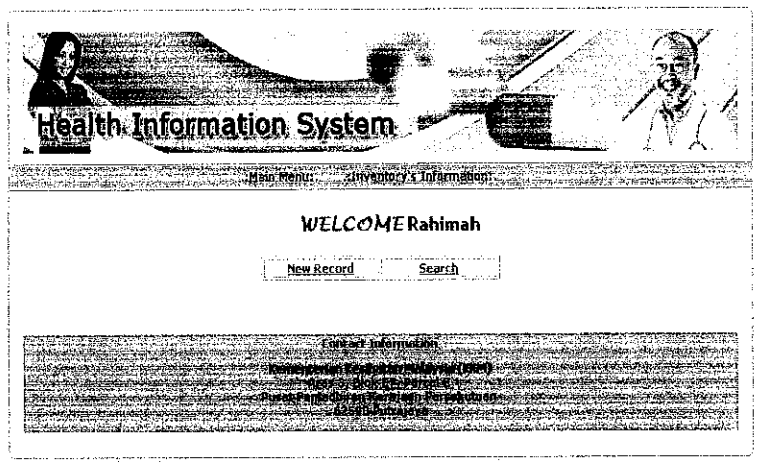
	**Description:** Once the staff clicks to Patient's Information link, the system will directly link the staff to the patient's main page. It consist of two main linkages namely New Record for new patient and Search for existing patients.

Table 4.4.4: Patient's Information Main Page.

New Patients.

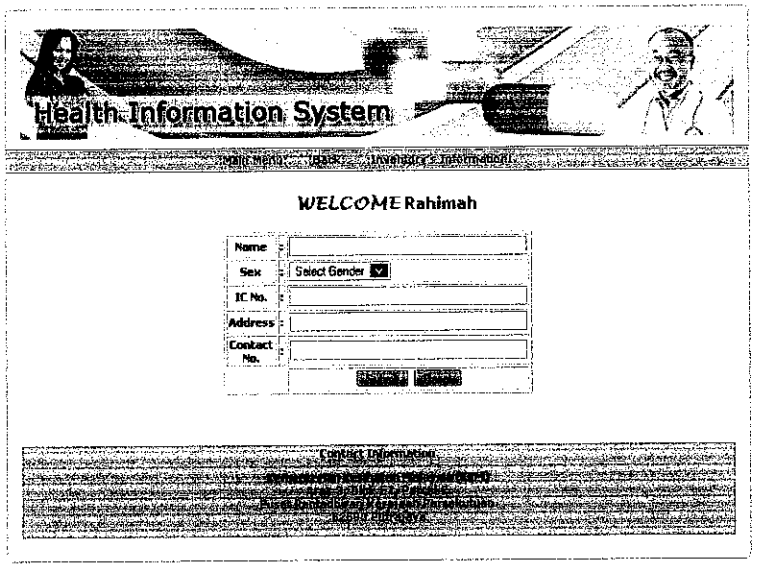
	**Description:** For new patients, the staff needs to register their information in the system such as Name, sex, identification number (IC), address as well as contact number. When it is successful, the popup message will occur.

Table 4.4.4.1: New Patient's Record Page.

Successful Register New Patient.

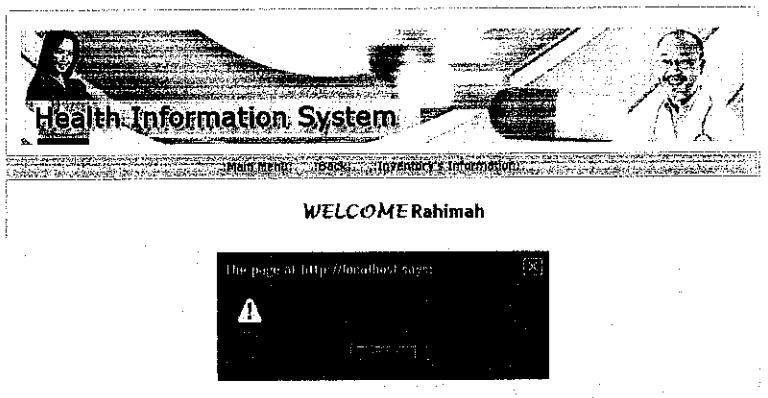
	**Description:** Once a staff manages to enter the entire patient's data needed, the system will pop up a message "Registration is successful!"

Table 4.4.4.2: Successful Register New Patient Page.

Existing Patients.

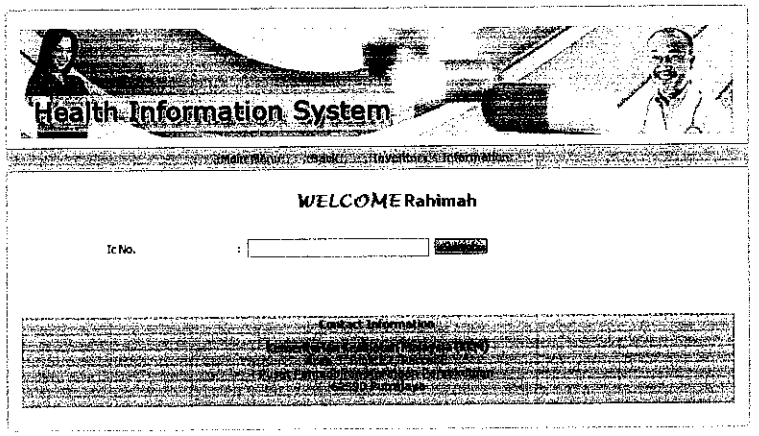
	**Description:** For existing patients, the staff only needs to enter their identification number or IC in order to search their data in the system.

Table 4.4.4.3: Search Existing Patient's Record Page.

Existing Patient's Result.

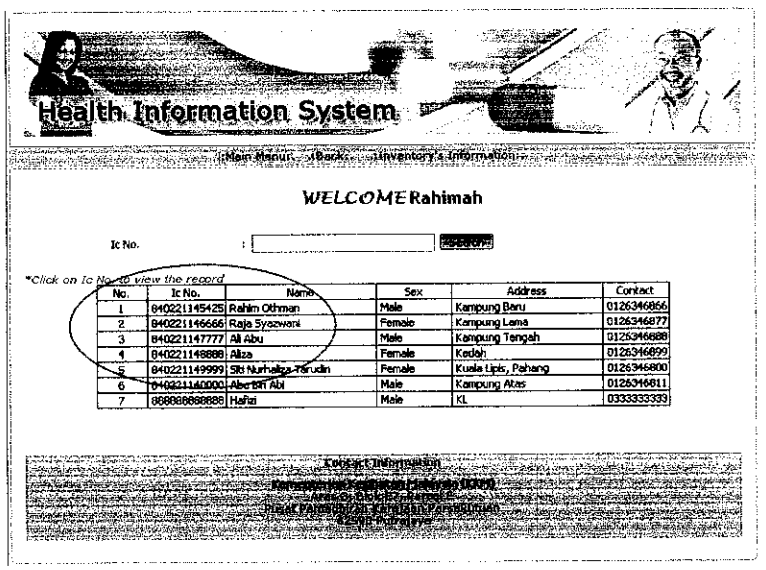
	**Description:** After entering the IC No into the system, the system will automatically generate all the data from the register page such as Name, Sex, Address and Contact.

Table 4.4.4.4: Existing Patient's Result Page.

Inventory's Information.

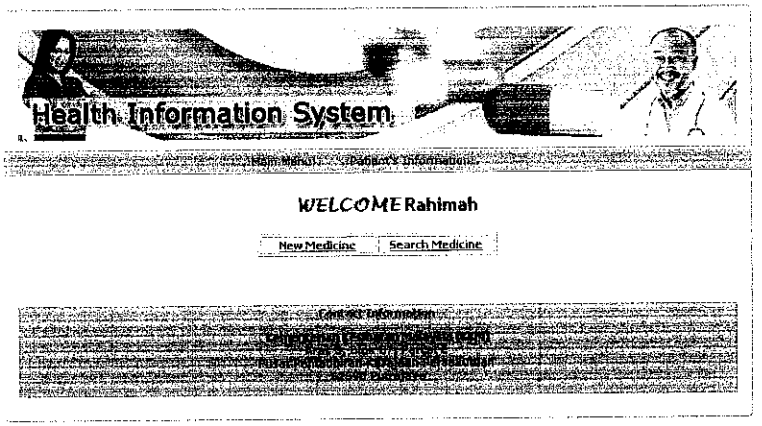
	**Description:** When staff clicks to Inventory's link, it will directly go to main page. Consist of two linkages namely New Medicine and Search Medicine.

Table 4.4.5: Inventory's Information Main Page.

New Inventory.

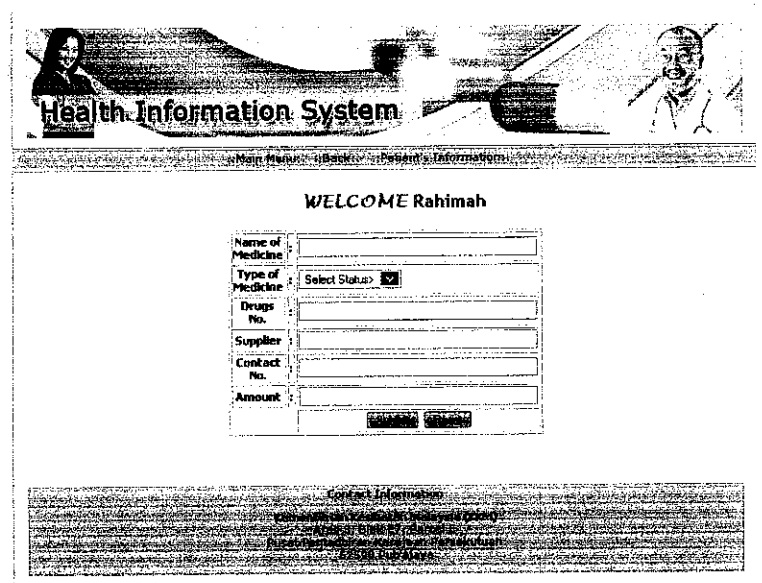
	**Description:** For new medicine, the staff needs to register its information in the system such as Name, Types, Drugs number, Supplier as well as contact number. When it is successful, the popup message will occur.

Table 4.4.5.1: New Inventory's Information Page.

Successful Register.

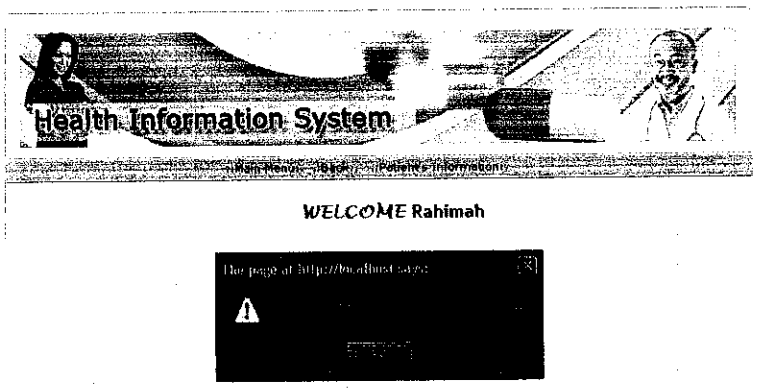
	**Description:** Once a staff manages to enter the entire medicine's data needed, the system will pop up a message "Medicine is update!"

Table 4.4.5.2: Successful Register New Medicine Information Page.

Current Medicine Status.

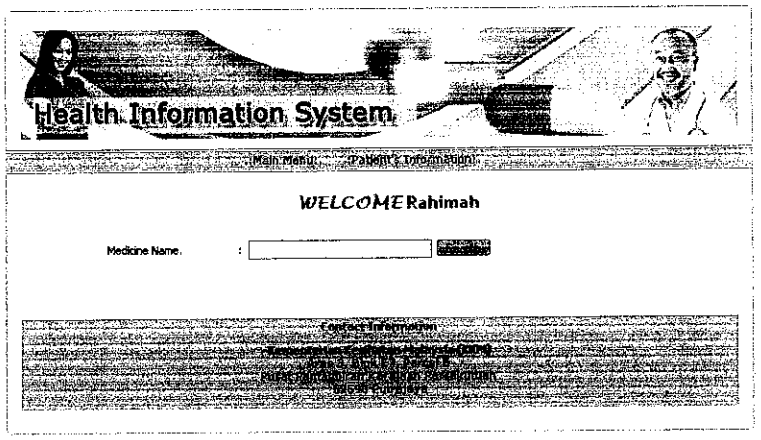
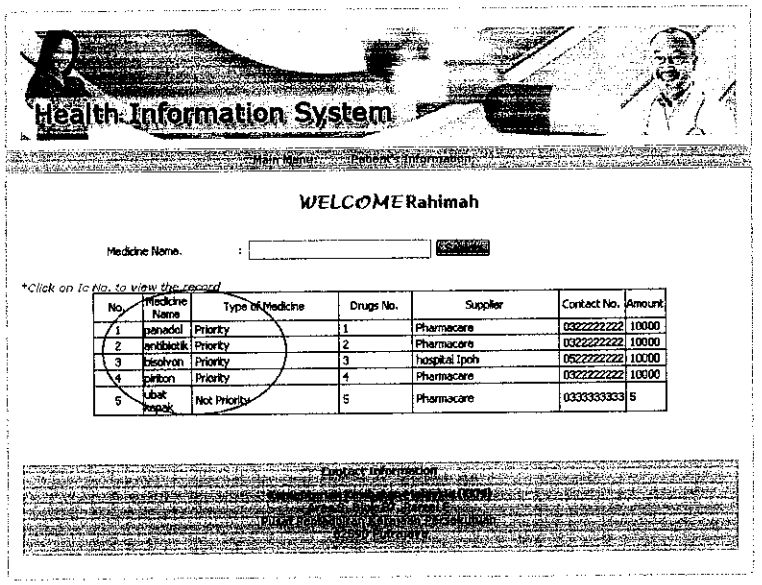
	**Description:** For current medicine, the staff only needs to enter their identification number in order to search their data in the system.

Table 4.4.6: Search Inventory's Information Page.

Current Medicine Result.

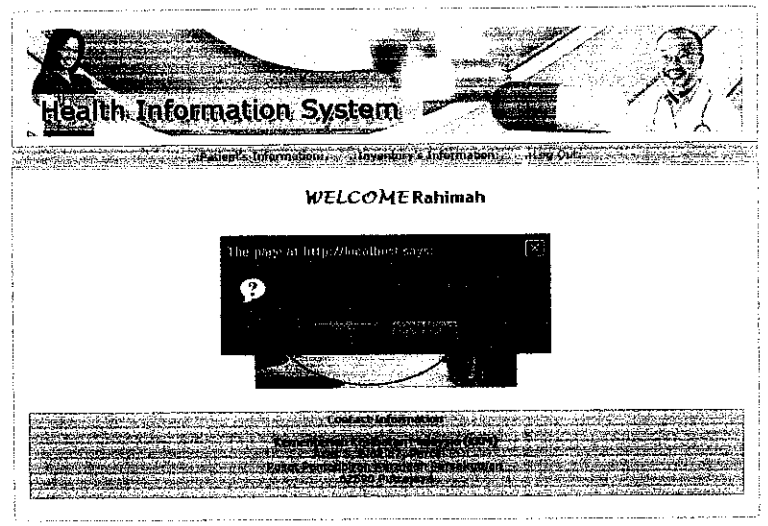


Description:

After entering the Medicine Name into the system, the system will automatically generate all the data from the register medicine page such as Name of medicine, Type of priority, Drugs No, Supplier, Contact No, and Amount.

Table 4.4.6.1: Current Medicine Result.

Logout.



Description:

To logout from the system, the staff only needs to click the logout link and the pop up message will appear to before the system shut down and back to welcome menu.

Table 4.4.7: Logout system.

Doctor via Administration Page.

Basically in the administration section is similar to staff section but it has additional link which is call as Diagnosis' Information. At this page, doctor can easily search the patient by using their IC No and do the diagnosis as usual. The doctor also can see all the medical history about his patient.

Doctor Main Page.

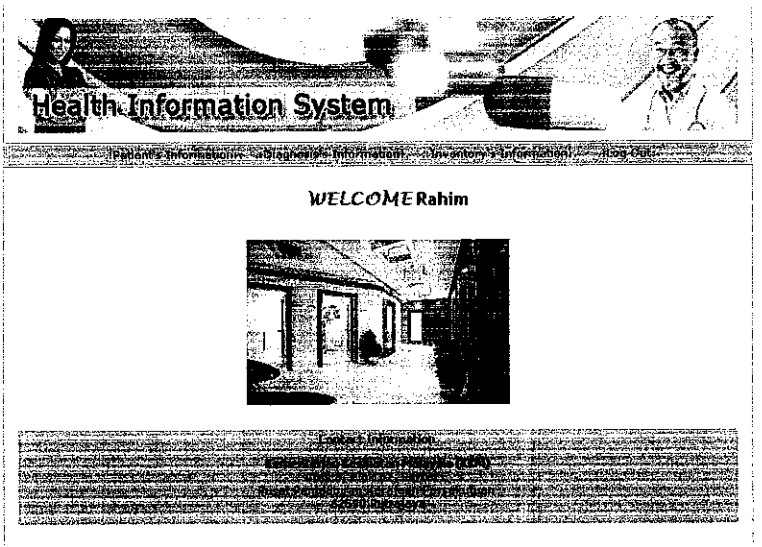
	**Description:** After successfully log in to the system, the student can view the main menu in the main page. There will consist of four different linkages. They are Patient's Information, Diagnosis's Information, Inventory's Information as well as Log out. But the focus for doctor page is more on Diagnosis's Information page. The rest is similar to the staff pages.

Table 4.4.8: Doctor via Administration Main Page.

Diagnosis's Information.

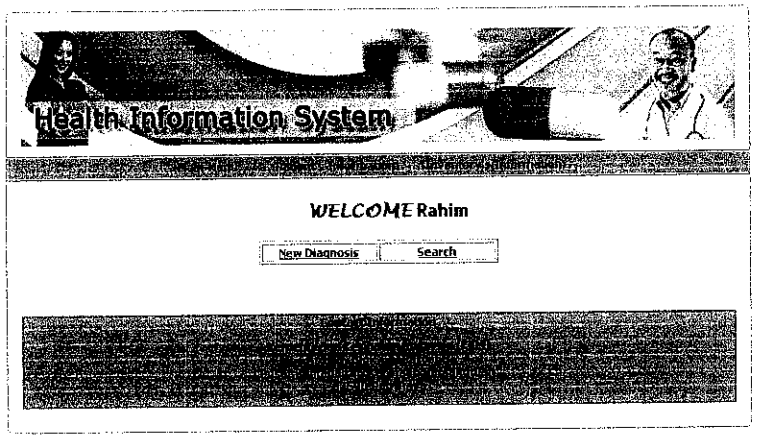
	**Description:** Once the doctor clicks to Diagnosis's Information link, the system will directly link the doctor to the diagnosis's main page. It consist of two main linkages namely New Diagnosis for new diagnosis data and Search for existing diagnosis.

Table 4.4.9: Diagnosis's Information Page.

Diagnosis.

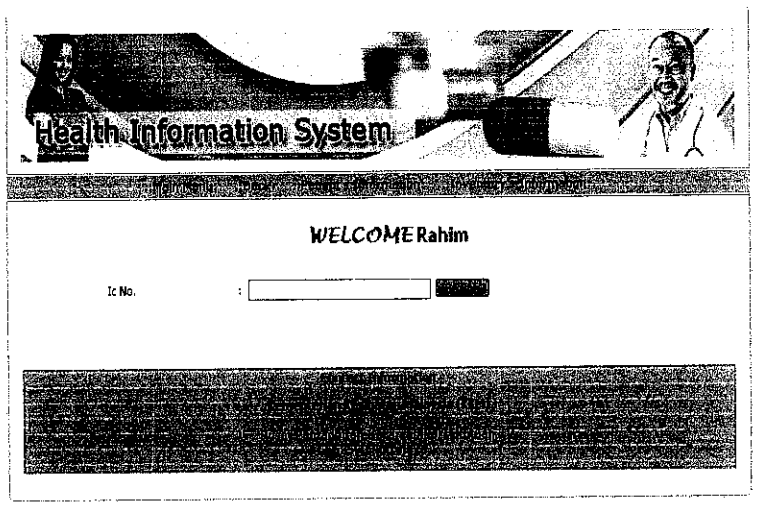
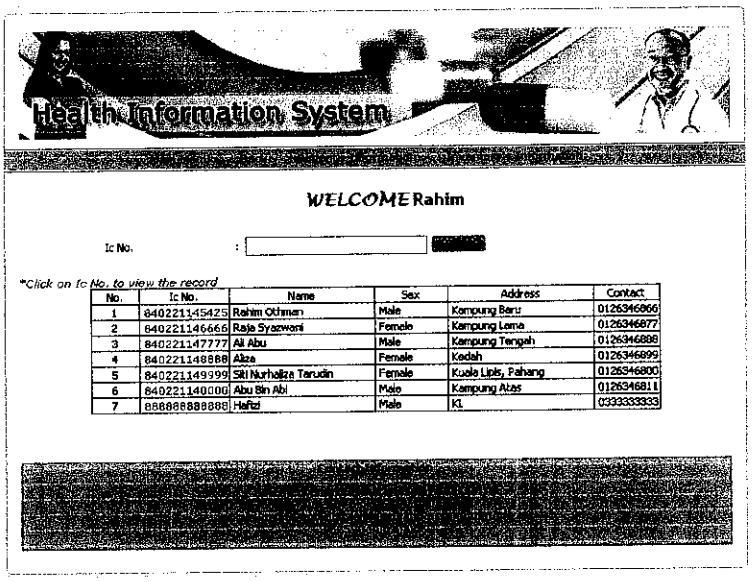
	**Description:** For existing diagnosis data, a doctor only needs to enter their identification number or IC in order to search their diagnosis history in the system.

Table 4.4.10: Diagnosis Page.

List of Patient's Diagnosis.

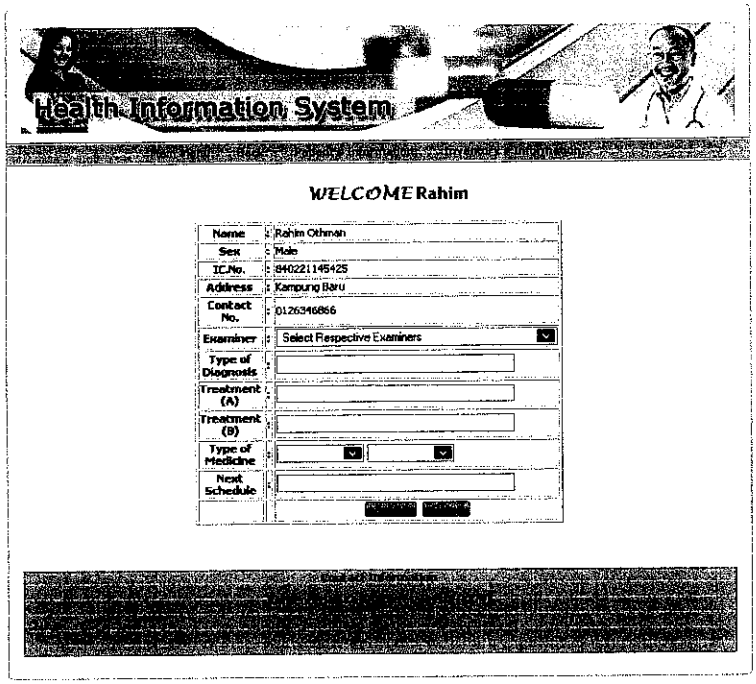


Description:

Once the doctor click search button, all the data regarding on the patient need to be check up will appear. The doctor needs to only click at the IC No to be forwarded to the diagnosis form.

Table 4.4.10.1: List of Patient Needs to Diagnosis.

Diagnosis Forms.



Description:

Once the doctor click search button, all the data regarding on the patient need to be check up will appear. The doctor needs to only click at the IC No to be forwarded to the diagnosis form.

Table 4.4.10.2: Diagnosis Forms.

Successful Diagnosis.

	**Description:** Once a doctor fully enters the entire patient's data needed, the system will pop up a message "Registration is successful!"

Table 4.4.10.3: Successful Diagnosis.

Search Diagnosis History.

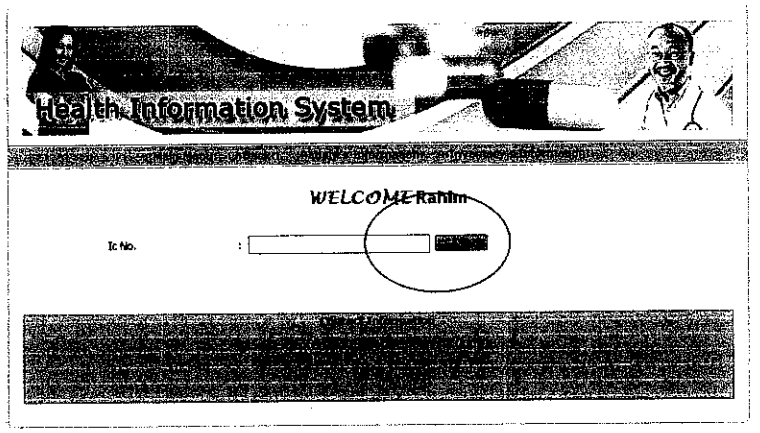
	**Description:** To view all the history regarding on the patient's information, the doctor need only click the search button.

Table 4.4.11: Diagnosis History Page.

Diagnosis History Results.

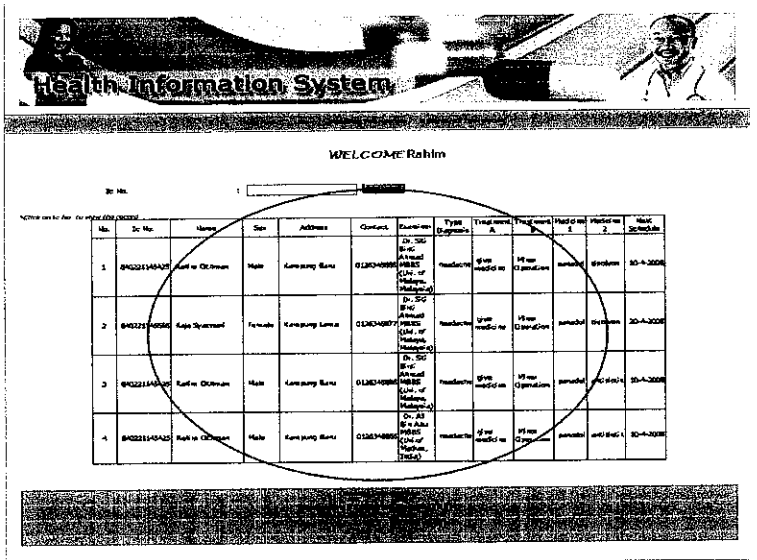
	**Description:** In this page, the doctor can view every patient's data including self information as well as the diagnosis attended and medicine that had been taken.

Table 4.4.12: Diagnosis History Page.

Logout.

	**Description:** To logout from the system, a doctor only needs to click the logout link and the pop up message will appear to before the system shut down and back to welcome menu.

Table 4.4.13: Logout system.

Because of this system has not yet been release to the end user, so there will be a user acceptance testing that needs to be conduct in the future.

CHAPTER 5
CONCLUSION

5.0 Conclusion

'Applying Information System in Healthcare Organization: A Case Study in Small and Medium Sizes of Clinics' is a research specially done to identify why most of the clinicians still refuse to use automated system to assist their daily task and also to develop a prototype that can assist the clinicians in their daily task. It is hope that by having a prototype; it will be a model to a clinic's system to apply it for enhances the performance of job process by providing paperless environment. The functions consist in the prototype are easy to navigate and user friendly, it will make the clinicians daily task easier.

Successful development of the prototype will eliminate the current process whereby clinicians can easily update their daily patients and inventories data. Furthermore, the prototype can improve the efficiency and effectiveness to handle the reliability of the data. Through this study, the clinicians should realize how much important of ICT in the current business process. Hence, applying fully ICT environment in clinics will assist clinicians on their daily task.

5.1 Recommendations

For future upgrade and expansion:

1. For future enhancement, the author can provide an online payment system in order to ease both side (patients and clinics) to do the payment after treatment.

2. The author can provide a reminder about patient appointment on day basis. With having a reminder in the system such as a pop up message, a staff or a doctor can know on how many patients should get a treatment in daily basis.

3. It is recommended that this system should be considering the high performance database with high capabilities to support the processing of patient information as well as the diagnosis history. Because of the increasing of patient from time to time, it is recommended to use Oracle that can support larger capacity of database.

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APPENDICES

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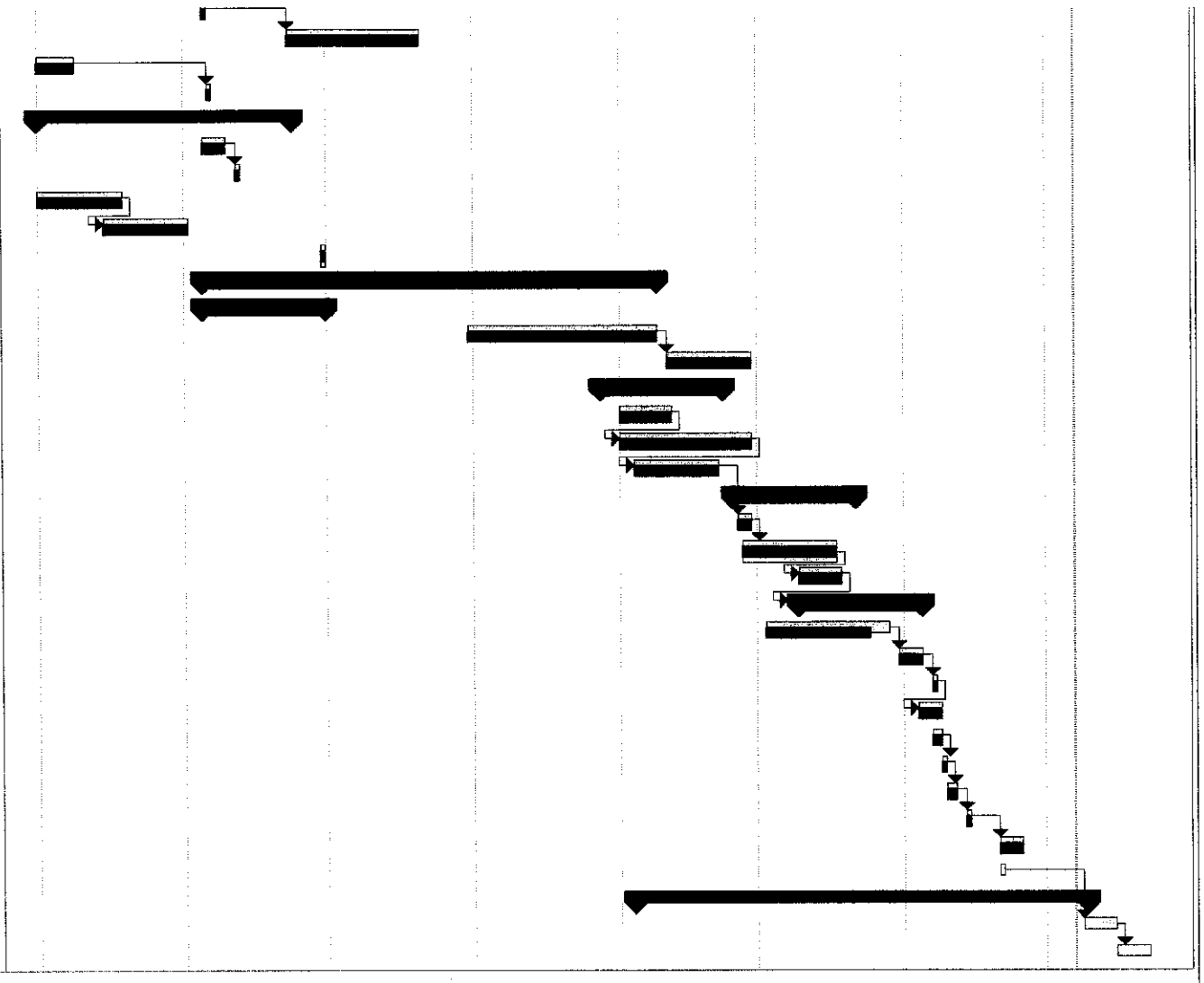
APPENDIX A: Gantt Chart

		Task Name	Duration	Start	Finish
2	✓	Meeting with supervisor	1 day	Mon 11/5/07	Mon 11/5/07
3	✓	Research	20 days	Fri 11/23/07	Thu 12/20/07
4	✓	Preliminary Investigation	6 days	Mon 10/1/07	Mon 10/8/07
5	✓	Determine Software needed	1 day	Tue 11/6/07	Tue 11/6/07
6	✓	**Planning**	40 days	Mon 10/1/07	Fri 11/23/07
7	✓	Plan for suitable methodology	5 days	Mon 11/5/07	Fri 11/9/07
8	✓	Plan for task duration	1 day	Mon 11/12/07	Mon 11/12/07
9	✓	Prepare preleminary report	14 days	Mon 10/1/07	Thu 10/18/07
10	✓	Prepare progress report	14 days	Mon 10/15/07	Thu 11/1/07
11	✓	Meeting with supervisor	1 day	Fri 11/30/07	Fri 11/30/07
12	✓	**Methodology**	70 days	Mon 11/5/07	Fri 2/8/08
13	✓	**Requirement Analysis**	20 days	Mon 11/5/07	Fri 11/30/07
14	✓	Survey, Interview and Questionn	30 days	Mon 12/31/07	Fri 2/8/08
15	✓	Result and discussion	14 days	Mon 2/11/08	Thu 2/28/08
16	✓	**High Level Design**	20 days	Mon 1/28/08	Fri 2/22/08
17	✓	Storyboard	7 days	Fri 2/1/08	Mon 2/11/08
18	✓	Prototype-User Interface	20 days	Fri 2/1/08	Thu 2/28/08
19	✓	Progress report- Chapter 5	14 days	Mon 2/4/08	Thu 2/21/08
20	✓	**Low Level Design**	20 days	Mon 2/25/08	Fri 3/21/08
21	✓	Flow Chart Diagram	3 days	Tue 2/26/08	Thu 2/28/08
22	✓	Object Modelling: Class, Use Ca	14 days	Wed 2/27/08	Mon 3/17/08
23	✓	Progress Report- Chapter 4	7 days	Mon 3/10/08	Tue 3/18/08
24	✓	**Coding and System Developm**	20 days	Mon 3/10/08	Fri 4/4/08
25		Coding PHP	20 days	Mon 3/3/08	Fri 3/28/08
26	✓	Progress Report	5 days	Mon 3/31/08	Fri 4/4/08
27	✓	Seminar	1 day	Mon 4/7/08	Mon 4/7/08
28	✓	Final Progress Report	3 days	Fri 4/4/08	Tue 4/8/08
29	✓	Unit Testing	2 days	Mon 4/7/08	Tue 4/8/08
30	✓	Project Presentation (Pre-EDX)	1 day	Wed 4/9/08	Wed 4/9/08
31	✓	Final Report	2 days	Thu 4/10/08	Fri 4/11/08
32	✓	Final Report Submission	1 day	Mon 4/14/08	Mon 4/14/08
33	✓	Presentation	5 days	Mon 4/21/08	Fri 4/25/08
34		Oral Presentation	1 day	Mon 4/21/08	Mon 4/21/08
35		**Release**	70 days	Mon 2/4/08	Fri 5/9/08
36		**Closing**	5 days	Fri 5/9/08	Thu 5/15/08
37		Resertation	5 days	Fri 5/16/08	Thu 5/22/08



Project: Project1-aimver1.mpp
Date: Wed 5/7/08

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

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APPENDIX B: Questionnaires

1. What kind of system are these clinic uses in order to manage their daily patients info?

a) Online System :_____

b) Manual System :_____

Reason:_____

_____

_____

2. Do you prefer to manage daily task and information regarding on patients, medicine as well as inventory through: (Please tick either one and state why)

a) Online System :_____

b) Manual System :_____

Reason:_____

_____

_____

2. How would you rate your satisfaction on the current manual system?

Strongly Dissatisfied	Dissatisfied	Neither Satisfied or Dissatisfied	Satisfied	Strongly Satisfied
☐	☐	☐	☐	☐

3. Do you think that the current process should be automated to fully automated system? (Please tick either one and state why)

a) Yes :_____

b) No :_____

Reason:_____

_____

_____

4. Do you think that the current process is difficult and hard to manage?

a) Yes

b) No

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APPENDIX C: Sample of Interview Questions (Staff)

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(This questionnaire will act as an evaluation form on the websites that will be tested as part of the fulfillment on UTP Final Year Project. Your cooperation is highly appreciated. Thank You.)

1. How could Health Information System help clinicians in their daily task?
2. What will make the difference if the proposed Health Information System is implemented compared to manual process?
3. Please comment on how to improve the current process through the proposed Online System.
4. Generally, how many staff in clinics deals with patient everyday?
5. Any additional comment regarding on current system?

Comment: -

_____

_____

_____

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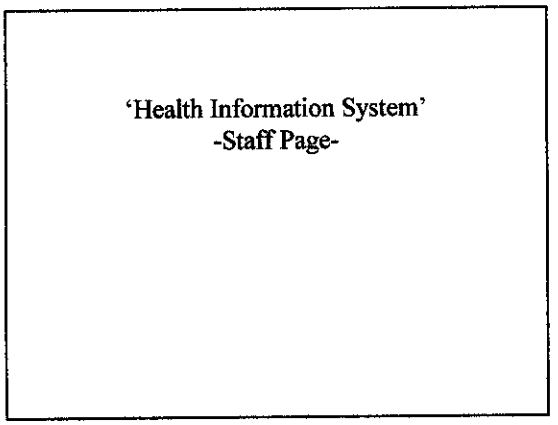
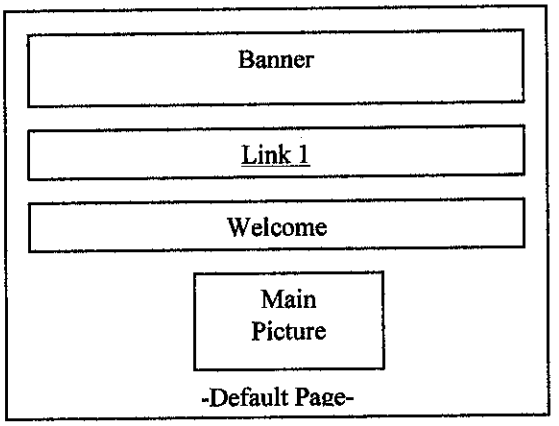
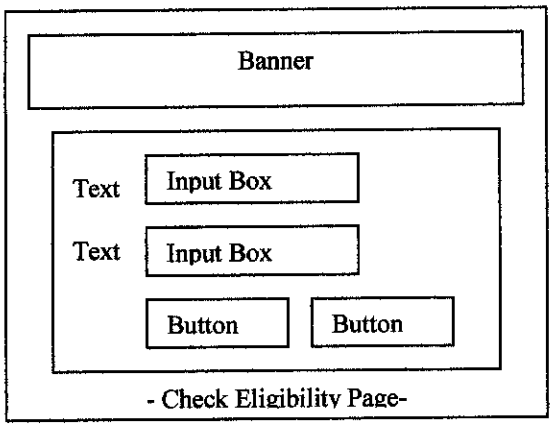
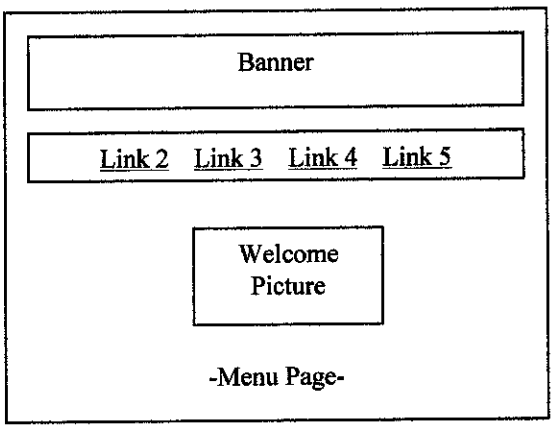
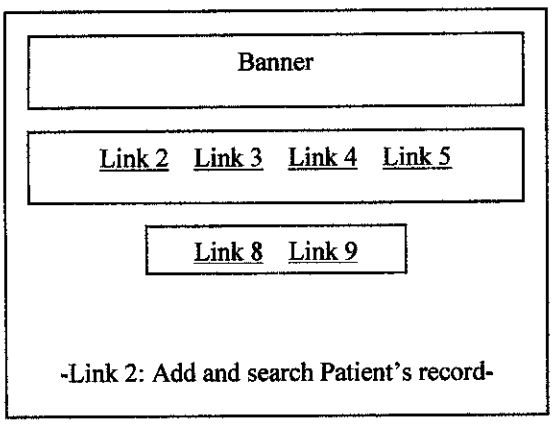
APPENDIX D: Storyboard

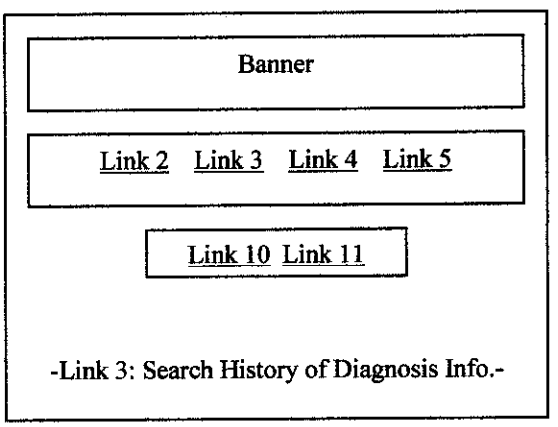

'Health Information System'
-Staff Page-

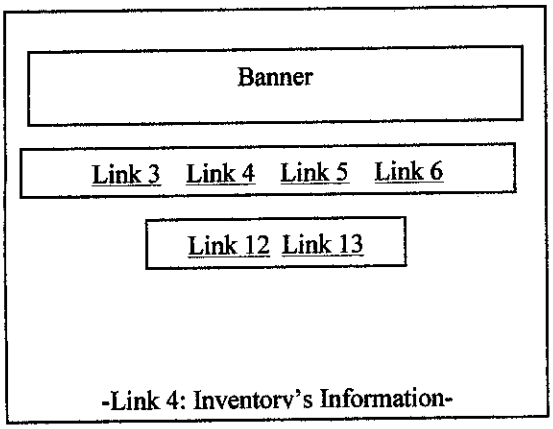

Banner
Link 1
Welcome
Main Picture
-Default Page-

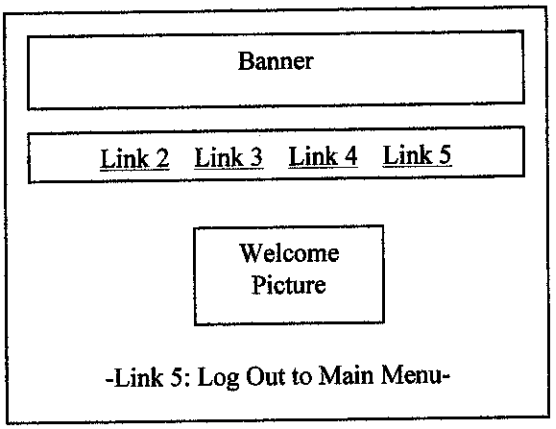

Banner
Text
Input Box
Text
Input Box
Button
Button
- Check Eligibility Page-

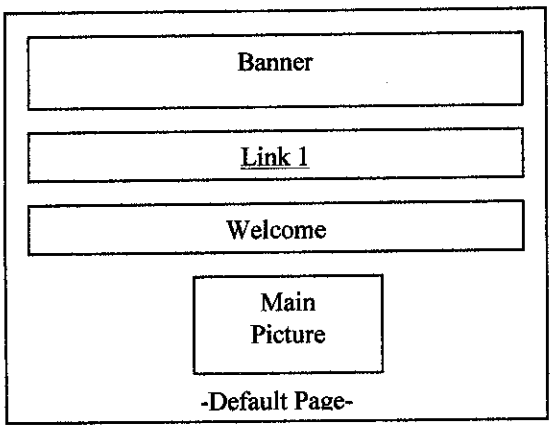

Banner
Link 2 Link 3 Link 4 Link 5
Welcome Picture
-Menu Page-


Banner
Link 2 Link 3 Link 4 Link 5
Link 8 Link 9
-Link 2: Add and search Patient's record-


Banner
Link 2 Link 3 Link 4 Link 5
Link 10 Link 11
-Link 3: Search History of Diagnosis Info.-


Banner
Link 3 Link 4 Link 5 Link 6
Link 12 Link 13
-Link 4: Inventory's Information-


Banner
Link 2 Link 3 Link 4 Link 5
Welcome Picture
-Link 5: Log Out to Main Menu-


Banner
Link 1
Welcome
Main Picture
-Default Page-

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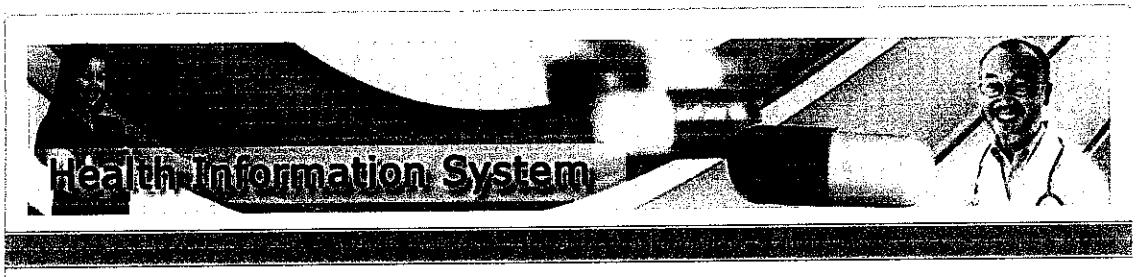
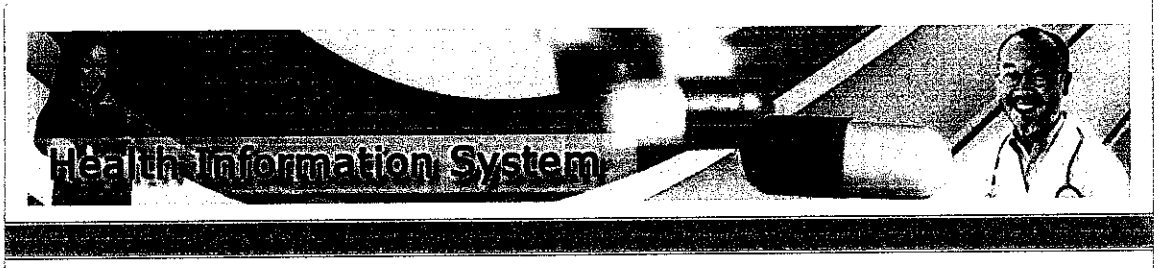
APPENDIX E: Screenshot (Main Page User Interfaces)



WELCOME Rahimah

Welcome Page for Staff Section



WELCOME **Rahim**

Welcome Page for Doctor Section

FINAL YEAR PROJECT ORAL PRESENTATION

Name : [redacted]
Matric No. : [redacted]
Supervisor : [redacted]
Project Title : [redacted]

24th April 2008

Overview of Outline

1.0 Introduction
- ✓ Project Background
- ✓ Description of the Problems
- ✓ Significant of the Project
- ✓ Objective and Scope of Project

2.0 Literature Review

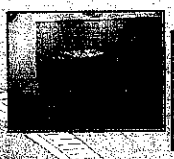
3.0 Methodology
- ✓ Data Gathering Method
- ✓ System Development Method
- ✓ Project Timeline
- ✓ Development Tools

4.0 Result and Discussions
- ✓ Limitations
- ✓ Recommendations
- ✓ Prototyping (User Interfaces)

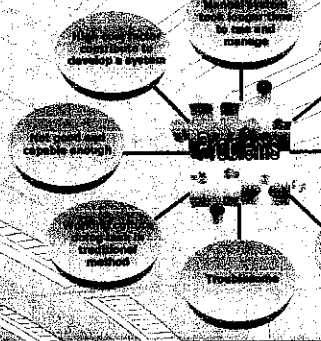
5.0 Conclusion
- ✓ Project Demo
- ✓ Q & A

Project Background

- Small and medium size clinics with few staffs and doctors provide outpatient services to patient with various symptom of sickness.
- Keep a lot of important patient's information.
- Most of the clinics are still using manual system in their daily business processes.
- Manual processes caused many related problems.




Description of the Problems

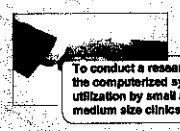


Significant of the Project

- This project focuses on understanding the business process of the small and medium size of clinics and develop a prototype that can support common and important business processes of the clinics. The prototype will help them to increase their effectiveness in running their daily business.


Objective and Scope of Project

- To study on computerized system utilization, business processes and develop a prototype for small medium sizes clinics.



To conduct a research on the computerized system utilization by small and medium size clinics.

To conduct a research on standard business process in different business functions commonly shared by clinics.

To develop a prototype to automate standard business processes for clinics.

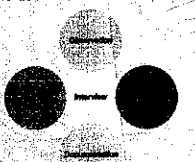
Literature Review

- Most of clinics and hospitals within Malaysia use computerized systems only to manage personal information of the patients. This is totally differs with European countries where computer applications and systems are used to study and analyze patient's data. In additional, many clinics and hospitals use small scale software only to manage financial and insurance information of patients which of course can only be assessed by accounts department. However, European countries use internet, intranet as well as web based system to facilitate doctors to access patient data efficiently. (Nabeel Tahir, 2007).
- Main agenda of Ministry of Health is to modernize all their services and improving their communication services to the clients. Because of this, clinicians should make themselves fully equipped and knowledgeable with the latest technology in providing a good quality services in order to gain client's trust. (Ministry of Health, 2007).

http://www.moh.gov.my/bm/corporate/agenda/mohmisi_kkm.html

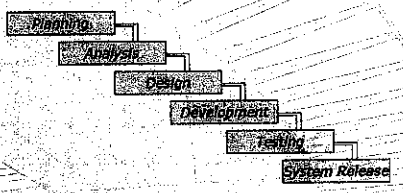
Research Methodology

- Information gathering method:
  - The assessment is based on review of various documents, general observation, conducting interviews with key personnel as well as analysis.
  - Surveys will be conducted using various sets of questionnaires distributed to end users as well as the clinic staffs.



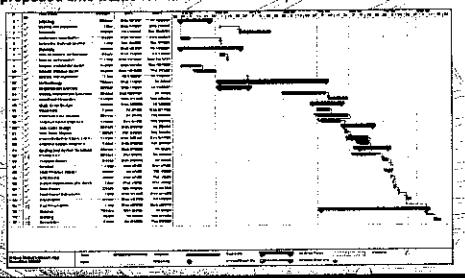
Methodology

- System Development Method:
  - The method that had been choose to be used in development process of the system is Waterfall Model.



Project Timeline (Gantt Chart)

- The project to doing a research as well as develop a prototype of clinical information system is expected to take almost 8 months. The proposed time frame for this research is depicted below:



Development Tools

Macromedia Dreamweaver MX

- This software will be used to create the user interfaces.

Adobe Photoshop CS2

- Graphic editor for image and graphic processing.

Results and Discussions

- Interviews have been done to 10 clinics around Kuala Lumpur.
- The author officially manage to interview 5 staff on duty on that day as well as unofficially interviewed 6 staff using a phone call.
- All clinics are using fully manual system to manage daily patients info.
- All clinics are still using manual system to manage daily task because:

Results and Discussions

- But they still admitted dissatisfy using manual system because:

Patient records easily misplace or lost due to careless

Lots of old paper still stored in the clinics cabinet.

- All clinicians agree that the current process should be automated because it helps their daily task in clinics.
- Clinicians agree to the fact that current manual system is hard to manage.

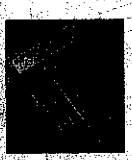
Results and Discussions

Summary of interviews:

Results	Comments	Out of 100%
• Current System	• Reasons: 1.Most clinicians only being exposed to manual system rather than online system.	•100% (Online System)
• System Preferences	• Reasons: 1.Most of the clinics refuse to develop their own system because of the high cost factor.	•40% (Online System) •60% (Manual System)
• Current system satisfaction	• Reasons: 1.Most of the clinicians only being exposed to manual system not an online system. 2.This is due to undecided opinion since they never try an online system for their daily task.	•10% (Dissatisfied) •20% (Satisfied) •70% (Neutral)
• Clinician's feedback to automate current system	• Reasons: 1.Either staff satisfied or not with the current system, the upper management will make a final decisions.	•10% (Yes) •20% (No) •70% (Neutral)
• Current system security	• Reasons: 1.Most of the clinicians are concerns about spaces that need to stored the old and current files that increase from time to time.	•30% (No) •70% (Yes)

Limitations

- No reminder notification.
- Clinicians still need to update the current medicine stock with the supplier manually.
- Online payment - Did not provide any platform for patients to do the payment transactions through their employers.

Recommendations

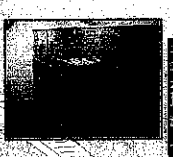
- The author can provide an online payment system in order to ease both side (patients and clinics) to do the payment after treatment.
- The author can provide a reminder about patient appointment on day basis. With having a reminder in the system such as a pop up message, a staff or a doctor can know on how many patients should get a treatment in daily basis.
- Make the system database centralized so the clinics can have patients current data.
- In the future the system can generate and print reports.

Prototyping (User Interface)

Welcome Page	Login Page
	
In the welcome page there will be a link to Login page. This welcome page is more to welcome the user for using a Health Information system.	Only for those staff that is eligible will use their own ID and password to log in to the system. The password will be given to the eligible staff only.

Conclusion

- To ease clinicians in their daily task.
- Help to automate the task in enhancing the performance of job process by providing paperless environment.
- To ensure standardized, reduce human intervention and simplified business process in small and medium size clinics.




Project Demo